

# Subsurface Ordnance Characterization System (SOCS)

*An Effort between the OSD Joint Robotics Program, the US Army Environmental Center, and the AFRL/MLQ Robotics Group, Tyndall AFB, Florida*

## THE PROBLEM

The ability to effectively cleanup unexploded ordnance (UXO)-contaminated sites is limited by current state-of-the-art technologies in UXO detection and characterization. Advanced methods and technologies for UXO identification and characterization are needed.

The Construction Automation Branch of the US Air Force Research Laboratory, Materials and Manufacturing Directorate, Airbase and Environmental Technology Division (AFRL/MLQC) at Tyndall Air Force Base (AFB), Florida, is addressing these needs. We are actively investigating and demonstrating the application of autonomous technologies to support the detection and mapping of UXO items.

## THE OBJECTIVE

The overall program objective of the Construction Automation Branch is to establish, characterize, and demonstrate effective, reliable, and cost-efficient methods for detection and identification of UXO. The Subsurface Ordnance Characterization System (SOCS) project will provide site managers with the information needed to make informed decisions regarding which sensors or combinations of sensors will perform best at their specific UXO-contaminated sites.

## THE SOLUTION

The SOCS is being developed by AFRL/MLQC for identifying and mapping UXO items on former live fire ranges. The SOCS system presently incorporates a trailer-mounted magnetometer sensor and a suite of

ground penetrating radar (GPR) sensors towed over the area to be characterized.

Generated sensor data, which indicates the geographic locations of detected ordnance items, is stored for later processing. The tow vehicle incorporates a global positioning system (GPS) and inertial navigation system (INS) which provide navigation and path planning control functions. The vehicle operates autonomously after being initialized for the planned scenario by an operator via a command station. A Simultaneous Data Collection and Processing System (SIDCAPS) provides the required on-board sensor management and data storage.

## RETURN ON INVESTMENT

The return on the projected investment could be immense. The currently projected costs for cleanup of UXO-contaminated sites ranges from several hundred thousand dollars for small sites, to billions of dollars to clean up large, heavily contaminated sites like Jefferson Proving Ground. Target maps developed by current sensors and processing algorithms have high false target rates and low accuracy in identifying UXO. With such high error rates, remediation costs will be much higher than the cost of remediating only true UXO targets.

Development of new sensors and processing algorithms will greatly increase the accuracy of target maps when compared to current sensors. The use of SOCS to screen sites will allow site managers to focus on effective technologies only, thereby saving millions of dollars.



## POINT OF CONTACT

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